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(21) International Application Number: PCT/GB97/00193 (22) International Filing Date: 22 January 1997 (22.01.97) (30) Priority Data: 9601264.6 23 January 1996 (23.01.96) GB 9700820.5 17 January 1997 (17.01.97) GB (71) Applicant (for all designated States except US): A.W. HAINSWORTH & SONS LIMITED [GB/GB]; Spring Valley Mills, Stanningley, Pudsey LS28 6DW (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): WALTERS, Andrew, Paul [GB/GB]; A.W. Hainsworth & Sons Limited, Spring Valley Mills, Stanningley, Pudsey LS28 6DW (GB). THORNTON, Charles [GB/GB]; A.W. Hainsworth & Sons Limited, Spring Valley Mills, Stanningley, Pudsey LS28 6DW (GB). (74) Agent: PAWLYN, Anthony, Neil; Urquhart-Dykes & Lord, Tower House, Merrion Way, Leeds LS2 8PA (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: IMPROVEMENTS IN AND RELATING TO CLOTH (57) Abstract The invention provides an improved cloth and method for manufacturing it, particularly suitable for casino use. The cloth is dyed, printed with the required pattern and proofed against liquid spillage and staining by a solvent based fluorocarbon proofing agent. The proofed cloth also offers improved wear resistance over untreated cloth.		

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IMPROVEMENTS IN AND RELATING TO CLOTH

This invention concerns improvements in and relating to cloth, the treatment of cloth and a method for preparing such cloth, in particular, but not exclusively a cloth for use in surfacing gaming tables and equipment.

Surfacing cloths in general, and particularly those employed in casinos as playing surfaces, must offer the desired surface texture, evenly accept dyeing to the required colour and be accommodating to high quality and durable printing applied to them. It is also desirable that they provide high resistance to liquid spillages.

Prior art cloths may offer some of these properties but none are ideal and most are particularly problematical with liquid spillages as a waterproofing stage has not been possible for such printed cloths.

The present invention aims to provide a cloth product and a method for forming the cloth product which provides a desirable cloth texture, coupled with good printing susceptibility and above all excellent resistance to liquid spillages.

According to a first aspect of the invention we provide a cloth to which a print is applied in a desired pattern, and in which the cloth is treated by a solvent based fluorochemical or fluorocarbon proofing agent.

Preferably the cloth is of natural fibres. A wool cloth may be provided. Alternatively the cloth may be of synthetic material or be a mixture of synthetic and natural fibres.

The cloth may be of plain weave, double plain weave or prunelle or twill weave.

The cloth may be a gaming cloth. A gaming cloth may be provided with a weight of 500 to 900 g/m² or preferably 550 to 800 g/m².

Preferably the cloth is dyed with dyestuffs and most preferably dyes offering high dischargeability.

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Preferably the cloth is provided with a finish on one face, most preferably after dyeing. The finish may be of a face finish or melton finish type.

The print may be applied by screen printing. Alternatively the print may be provided by transfer printing.

Preferably the print and / or dye employed comprises one or more of a dye or print ink, urea, solubilising agent, coacervate, anti-foaming agent, and thickener. Most preferably the print and / or dye paste also employs one or more of a brightening agent, pH buffer and discharge agent. It is preferred that the print be in paste form.

Preferably the components provided are in the following proportions relative to a kilo of the complete print paste:-

Dye	0-80g/kg; preferably 0-50 g/kg; or
Print ink	200-400g/kg; preferably 100-200 g/kg and
Urea	40-80g/kg; and / or
Solubilising agent	20-80g/kg; preferably 40-80 g/kg and / or
Brightening agent	0-20g/kg; preferably 0-10 g/kg and / or
Coacervate	5-20g/kg; and / or
Anti-foam	2-7g/kg; preferably 2-5 g/kg and / or
pH buffer/acid donor	0-70g/kg; preferably 0-10 g/kg and / or
Thickener	300-500g/kg (at 8%); preferably 300-400 g/kg and / or
Wetting agent	0-10 g/kg and / or
Discharge agent	0-500g/kg.

All of the above agents may be present, with one of a dye or print ink, but preferably only a selection is provided. The agents may all be present and may all be within the ranges listed.

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Preferably the solvent base for the proofing agent is an organic solvent. Alternatively a water solvent can be used.

The active agent of the proofing agent may be present on the proofed cloth at between 20 and 200g/m² of cloth. A range of 30 to 160g/m² is preferred. A range of 30 to 50g/m² is preferred for active agents when applied from a water solvent. A range of 125 to 175g/m² is preferred for active agents when applied from an organic solvent.

Preferably the solvent based proofing agent is applied to the cloth at between 300 and 1200 g/m² total weight. A range of 450 to 550 g/m² is preferred for an organic solvent based proofing agent. Total weight aqueous solvent based applications of between 800 and 1200 g/m² may be used for proofing after printing and / or before printing.

Proofing agents such as polytetrafluoroethene, and / or perfluoralkylacrylic copolymers may be used.

According to a second aspect of the invention we provide a method for producing a cloth resistant to liquid spillages comprising the steps of:-

- a) providing a cloth;
- b) dyeing the cloth with a dyestuff;
- c) printing the required design on the cloth;
- d) treating the printed cloth with a solvent based proofing agent.

Where dye printing is used preferably step d) follows step c). Where transfer printing is used step c) may follow step d).

Preferably a wool cloth is used.

Preferably a dischargeable dyestuff is used.

Preferably the cloth is cleaned, after dyeing and / or printing, prior to proofing. Preferably the cloth is cleaned by washing, most preferably in water. The water may be provided with a detergent and / or a dye suspension agent. Suitable detergents include amphoteric nitrogenous washing agents.

Preferably a detergent level of between 1g and 5g and most preferably 2g per litre of water is used.

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Preferably the wash is carried out in water of 15 to 50°C.

Preferably the cloth is rinsed in water following washing.

Preferably the print is applied by screen printing. An ink or paste may be used. Alternatively a transfer print may be used.

Preferably the cloth is dried prior to proofing.

The proofing agent may be applied by spraying. An air propelled spray may be used. A spray gun may be employed.

Preferably the spray is applied by an even motion relative to the cloth. An even distribution is thus ensured.

An application of 300g/m² or more may be employed. A level of between 350 and 650 g/m² is preferred.

The proofing agent may be applied by padding, soaking or exhausting on the agent. Higher application levels may be used in such cases.

Preferably the method also includes one or more of the further steps of;

1. providing a melton or face finish to the cloth, preferably after step b)
2. treating the printed material by application of steam prior to step d), most preferably following discharge printing.
3. subjecting the solvent treated cloth to an evaporation and air curing stage, most preferable for an organic solvent treatment.
4. subjecting the solvent treated cloth to a heat curing stage, most preferable for an aqueous solvent treatment.

Preferably air curing is carried out for between 12 and 30 hours and most preferably 15 to 22 hours. Preferably the material is air cured flat and / or fully opened out and / or with the print side uppermost.

Preferably heat curing is carried out for between 1 and 10 minutes, more preferably for 2 to 3 minutes. A temperature of 150 to 170°C is preferred.

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Preferably a steam bed or steaming machine is used to apply the steam.

According to a third aspect of the invention we provide the use of a solvent based fluorochemical or fluorocarbon proofing agent to proof a cloth providing a gaming table or gaming surface.

An organic based or water based proofing agent may be used.

According to a fourth aspect of the invention we provide the use of a fluorochemical or fluorocarbon proofing agent to increase the abrasion resistance and / or wear resistance of a cloth.

Preferably the cloth is or is used in providing a gaming table or gaming surface.

Preferably a solvent based fluorocarbon or fluorochemical proofing agent is used. A water or organic based solvent may be employed.

Preferably the abrasion / wear resistance is increased by 15%, 20% or more, relative to an unproofed cloth under the same wear conditions. The wear resistance may be determined by British Standard BS 5690.1991, the contents of which are incorporated herein by reference. Preferably the relative performance is determined in terms of the relative number of Martindale rubs. A cloth according to the prior art may withstand 15000 Martindale rubs, whereas an equivalent cloth treated according to the present invention may withstand 18000.

According to a fifth aspect of the invention we provide a gaming table, surface or item of equipment using the cloth of the first aspect and / or cloth produced according to the second aspect and / or according to the use of the third aspect and / or the fourth aspect of the invention.

According to a sixth aspect of the invention we provide the use of a gaming table, surface or item of equipment according to the fifth aspect of the invention.

An embodiment of the invention will now be described, by way of example only.

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Cloth according to the invention is resistant to liquid spilling throughout a proofed lifetime, over 5000 Martindale rubs, following this initial treatment. The wear resistant lifetime is also increased, potentially to 18000 Martindale rubs for a typical cloth. The lifetime of the article is defined by the point at which the weave structure begins to be damaged with wear (As BS 5690.1991)

Resistance to water and / or oil spillage can be tested as follows:-

a) for water: a solution of 20% isopropanol, 80% distilled water, when placed on the cloth in drops will not wet the cloth in 10 seconds;

b) for oil: drops of N-Hexadecane when placed on the cloth will not wet the surface in 30 seconds.

The coverage for the cloth is even and thorough using the product and process of the present invention. Significant and unexpected increase in abrasion resistance for the treated cloth also arises in the present invention. A lifetime increase of over 20% compared with a conventional cloth under equivalent conditions of use arises. The cloth employed is a wool based cloth of the type normally employed for casino play surfaces and has a plain weave.

The dyestuffs to be applied to the fabric has a high dischargeability, that is the dye is susceptible to the action of a discharging agent.

Prior to the application of the print to define the gaming area, symbols and the like the cloth is provided with a melton finish in the conventional manner.

The print paste used consists of:-

Dye	0-80g/kg; or
Print ink	200-400g/kg; and
Urea	40-80g/kg;
Solubilising agent	40-80g/kg;
Brightening agent	0-20g/kg;
Coacervate	5-20g/kg;
Anti-foam	2-5g/kg;
pH buffer	0-70g/kg;

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Thickener	300-400g/kg (at 8%); and
Discharge agent	0-500g/kg.

The printing medium prepared in this form is in a paste like state. The dye used is discharge resistant.

The cloth is then mounted in a screen printing assembly and the desired level of print applied to the desired locations and in the desired colours. More than one screen printing stage may be involved in affecting this. The paste employed is discharge resistant.

To fix the print at the desired location the cloth is then passed to a steam bed where moist steam is applied to the material. A clear and defined motif or design on the product is thus fixed permanently in position.

Prior to the application of the proofing agent a thorough cleaning of the cloth is provided. The cloth is emersed in water at between 15 to 50°C. Provision of a detergent and dye suspension agent in the water encourages the full removal of any residual print paste components.

Following washing and thorough rinsing the cloth is dried. Removal of the paste components ensures thorough proofing of the cloth and avoids the retention of abrasive particles on the cloth which could otherwise reduce its effective life.

To proof the printed cloth against liquid spillages an organic solvent based fluorocarbon agent is then sprayed on to the cloth. It is preferred that an organic solvent based proofing agent should be used after printing as water solvent based agents act best before the printing stage.

To ensure that the cloth is adequately coated by the proofing agent the solvent is evaporated and the cloth subjected to air curing before finishing.

A product produced in this way shows much improved resistance to liquid spillage over and above prior art treated cloths and also possesses greater wearing properties.

CLAIMS:

1. A surfacing cloth for playing surfaces or casino equipment which cloth is dyed with a dyestuff and to which print is applied in a desired pattern, the cloth having a weight of 500 to 900 g/m², the cloth being treated by a solvent based fluorocarbon proofing agent, the active agent of the proofing agent being present on the cloth at 20 to 200 g/m².
2. A surfacing cloth, the cloth being a cloth to which a print is applied in a desired pattern and in which the cloth is treated by a solvent based fluorocarbon proofing agent.
3. A cloth to which a print is applied in a desired pattern, and in which the cloth is treated by a solvent based fluorochemical or fluorocarbon proofing agent.
4. A cloth according to any of claims 1 to 3 in which the cloth is of natural fibres, wool, synthetic material or a mixture of synthetic and natural fibres.
5. A cloth according to any of claims 1 to 4 in which the cloth is dyed with dyestuffs offering high dischargeability.
6. A cloth according to any of claims 1 to 5 in which the cloth is provided with a finish on one face, most preferably after dyeing.
7. A cloth according to claims 1 to 6 in which the print is applied by screen printing or by transfer printing.
8. A cloth according to any of claims 1 to 7 in which the print and / or dye comprises, in a kg of print or dye:
Dye at 0-80g/kg or print ink at 200-400g/kg and one or more of urea at 40-80g/kg, solubilising agent at 20-80g/kg, brightening agent at 0-20g/kg, coacervate at 5-20g/kg, anti-foam at 2-7g/kg, pH buffer/acid donor at 0-70g/kg, thickener at 300-

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500g/kg; (at 8%), wetting agent at 0-10 g/kg and discharge agent at 0-500g/kg.

9. A cloth according to any of claims 1 to 8 in which the solvent base for the proofing agent is an organic solvent or a water solvent.

10. A cloth according to any of claims 1 to 9 in which the active agent of the proofing agent is present on the proofed cloth at 30 to 160g/m².

11. A cloth according to any of claims 1 to 10 in which the solvent based proofing agent is applied to the cloth at between 300 and 1200 g/m² total weight.

12. A method for producing a surfacing cloth for playing surfaces or casino equipment which cloth is resistant to liquid spillages and comprising the steps of:-

- a) providing a cloth having a weights of 500 to 900 g/m²;
- b) dyeing the cloth with a dyestuff;
- c) printing the required design on the cloth;
- d) treating the printed cloth with a solvent based proofing agent, the active agent of the proofing agent being present on the cloth at 20 to 200 g/m² of cloth.

13. A method for producing a cloth resistant to liquid spillages comprising the steps of:-

- a) providing a cloth, preferably wool;
- b) dyeing the cloth with dischargeable dyestuff;
- c) screen printing the required design on the cloth using a paste or ink;
- d) treating the printed cloth with a solvent based proofing agent.

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14. A method for producing a cloth resistant to liquid spillages comprising the steps of:-

- a) providing a cloth;
- b) dyeing the cloth with a dyestuff;
- c) printing the required design on the cloth;
- d) treating the printed cloth with a solvent based proofing agent.

15. A method according to claims 12 to 14 in which the cloth is cleaned, after dyeing and / or printing, prior to proofing.

16. A method according to claim 15 in which the cleaning is performed by a wash which is carried out in water of 15 to 50°C.

17. A method according to claim 15 or 16 in which the cloth is rinsed in water following washing.

18. A method according to any of claims 12 to 17 in which the cloth is dried prior to proofing.

19. A method according to any of claims 12 to 18 in which the proofing agent is applied by spraying.

20. A method according to any of claims 12 to 18 in which the proofing agent is applied by padding, soaking or exhausting on the agent.

21. A method according to any of claims 12 to 20 in which an application of 300 g/m² or more of the solvent based proofing agent (total weight) is employed.

22. A method according to any of claims 12 to 21 including treating the printed material by application of steam prior to step d).

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23. A method according to any of claims 12 to 22 including subjecting the solvent treated cloth to an evaporation and air curing stage.

24. A method according to any of claims 12 to 23 including subjecting the solvent treated cloth to a heat curing stage.

25. The use of a solvent based fluorochemical or fluorocarbon proofing agent to proof a cloth providing a gaming table or gaming surface.

26. The use of a fluorochemical or fluorocarbon proofing agent to increase the abrasion resistance and / or wear resistance of a cloth.

27. The use of claim 26 in which the cloth is or is used in providing a gaming table or gaming surface.

28. A gaming table, surface or item of equipment using the cloth of any of claims 1 to 11 and / or the cloth produced according to any of claims 12 to 24 and / or according to the use of any of claims 25 to 27.

29. The use of a gaming table, surface or item of equipment according to claim 28.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 D06M23/10 A63D15/00 D06P1/00 D06P5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 D06M A63D D06P A63F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	DATABASE WPI Section Ch, Week 8203 Derwent Publications Ltd., London, GB; Class A18, AN 82-05074E XP002032363 & JP 56 159 350 A (TEIJIN LTD) , 8 December 1981 see abstract ---	1-29
Y	EP 0 503 114 A (LAUTERBURG & CIE AG) 16 September 1992 see the whole document ---	1-6, 8-18, 20-29
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	WO 86 05110 A (HALL DAVID ALLAN) 12 September 1986 see page 6, line 16 - line 27; claims ---	1-29
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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